

NUMBER
108-5004

Customer Release

AMP SECURITY CLASSIFICATION

108-5004

4mm Dia. SHUR Plug & Receptacle

P/N 170002-2/-7;170012-1/-2

Product Specification

1. Scope:

1.1 Scope:

This specification covers general performance requirements and test methods for 4mm dia. SHUR Plug and receptacle(hereafter called plug and receptacle respectively) of the part numbers shown in the title of this document.

1.2 Product Feature:

Plug contact is a male contact in cylindrical configuration designed to fit into receptacle female contact having specified internal diameter to accept plug contact.

1.3 Applicable Wire Range:

Wires of the specified sizes shown in the applicable customer product drawing(s) shall be used for termination.

2. Applicable Documents:

- 2.1 ASTM B 36 Copper Alloy No. 260, Brass Strips
- 2.2 MIL-C-50, Copper Alloy, Brass Strips
- 2.3 JIS C 3406, Low-Voltage Cables for Automobiles.

3. Product Configuration:

3.1 Materials and Finish:

Product contacts shall be made of the material, and finished in accordance with applicable customer product drawing(s).

3.2 Design Feature and Construction:

Product design feature, construction and dimensions shall be conforming to the applicable requirements specified in customer product drawing(s).

3.3 Electrical Performance Requirements:

3.3.1 Millivolt Drop:

When tested in accordance with the test method specified in Para. 4.3.1, low level millivolt drop across the terminated portion consisting of crimped portion of plug contact, frictional mating area and crimped portion of receptacle contact shall be within the value specified in Table 1.

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| | | | CHK <i>[Signature]</i> 4-4-78 | | | LOC J A | | NO 108-5004 | |
| | | | APP <i>[Signature]</i> 4-4-78 | | | REV D | | | |
| D | REVISED | RFA-1973 | <i>[Signature]</i> | 9/3 | SHEET 1 OF 5 | | | | |
| C1 | REVISED | RFA-1892 | <i>[Signature]</i> | 10/2 | | | | | |
| C | Revised & Retyped per | RFA-294 | <i>[Signature]</i> | 11/4 | | | | | |
| LTR | REVISION RECORD | | DR | CHK | DATE | NAME | | Product Specification 4mm Dia. SHUR Plug and Receptacle | |

| Wire Size | | Test Current (A) | Millivolt-Drop (mV) | Temperature Rise (°C) |
|-----------------|-------|---------------------|------------------------|--------------------------|
| mm ² | (AWG) | | | |
| 0.5 | (#20) | 4 | 12 | 20 |
| 0.85 | (#18) | 7 | 21 | 20 |
| 1.25 | (#16) | 10 | 30 | 30 |

Table 1

3.3.2 Contact Resistance of Mated Portion:

When tested in accordance with the test method specified in Para. 4.3.1, contact resistance of mated portion of contacts shall be within 2 mΩ.

3.3.3 Temperature Rising:

When tested in accordance with the test method specified in Para. 4.3.1, temperature rising shall not exceed the specified value as shown in Table 1.

3.4 Physical Performance:

3.4.1 Tensile Strength:

When tested in accordance with the test method specified in Para. 4.3.2, tensile strength of wire crimp of plug and receptacle contacts shall be not less than the value specified in Table 2.

| Wire Size | | Tensile Strength |
|-----------------|-------|------------------|
| mm ² | (AWG) | N (kgf) |
| 0.5 | (#20) | 78 (8) |
| 0.85 | (#18) | 147 (15) |
| 1.25 | (#16) | 196 (20) |


Table 2

3.4.2 Insertion Force:

When tested in accordance with the test method specified in Para. 4.3.3, insertion force shall not exceed the value specified in Table 3.

| Plug Contact | Receptacle Contact | Insertion Force (Max.) |
|--------------|--------------------|------------------------|
| | | N (kgf) |
| 170002-7 | 170012-1 | 59 (6.0) |
| 170002-2 | 170012-2 | 59 (6.0) |

Table 3

| | | | | |
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3.4.3 Extraction Force:

When tested in accordance with the test method specified in Para. 4.3.3, extraction force shall be within the range specified in Table 4.

| Plug Contact | Receptacle Contact | Extraction Force | |
|--------------|--------------------|------------------|--------------|
| | | N (kgf) Min. | N (kgf) Max. |
| 170002-7 | 170012-1 | 15 (1.5) | 59 (6.0) |
| 170002-2 | 170012-2 | 15 (1.5) | 59 (6.0) |

Table 4

4. Quality Assurance Provisions:

4.1 Test Conditions:

Unless otherwise specified, all the tests shall be conducted in any combination of the following test conditions.

Temperature: 20 - 30 °C
 Relative Humidity: 31 - 80%
 Atmospheric Pressure: 81 - 105 KPa (610 - 790mmHg)

4.2 Test Sample Preparation:

4.2.1 Specimens:


The test samples to be employed for performance evaluation testing shall be prepared in accordance with the specified crimping procedure by using contacts randomly selected from current production run, crimped on the wires of specified sizes.

4.2.2 Applicable Wires:

The wires of the following size and strand composition, conforming to JIS C 3406, Low Voltage Cables for Automobiles, shall be used for sample preparation.

| Wire Size | | Conductor Cross-Sectional Area (mm ²) | Strands Composition | | |
|-----------------|-------|---------------------------------------------------|---------------------------|----------------|-------------------------|
| mm ² | (AWG) | | Diameter of a Strand (mm) | No. of Strands | Circular Mil Area (CMA) |
| 0.56 | (#20) | 0.56 | 0.32 | 7 | 1111 |
| 0.88 | (#18) | 0.88 | 0.32 | 11 | 1746 |
| 1.28 | (#16) | 1.28 | 0.32 | 16 | 2540 |

Table 5

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4.3 Test Method:

4.3.1 Millivolt Drop Method (Fig. 1):

Millivolt drop of total terminated area and contact resistance of frictional mated contact area are obtained from the measurement by means of millivolt drop method. The test circuit is formed in the manner as shown in Fig. 1, DC test current is applied across $Z_1 - Z_2$ with the intensity specified in accordance with the wire size used, as shown in Table 1. The crimped wires must be long enough (approximately longer than 91.5 cm) for sufficient effect of heat dissipation that is resulted from energized load. A pair of plug and receptacle contacts shall be crimped on the wires of same size. Millivolt drop is measured after temperature rising of the circuit becomes stabilized, by probing at Y_1 and Y_2 with the use of DC voltmeter. This measurement reading includes the resistance of crimped wires (76.2mm X 2 pcs.). Therefore, the final resistance must be calculated after deducting the resistance value of the wires.

The resistance of frictional mated contact area is measured by probing across points $X_1 - X_2$ with the use of test current of 4 A flowing through the circuit. Temperature rising is measured after temperature rising of the circuit becomes stabilized. For this test, thermocouple is applied to the back of contact mating portion, as shown in Table 1.

4.3.2 Tensile Strength Test Method:

Fasten a 152.4mm-long-wire crimped contact onto the head of tensile testing machine, and apply an axial pull-off load to the end of crimped wire, by operating the head to travel with the speed at a rate of 25.4mm a minute. Tensile strength of wire crimp is determined when the wire is broken or is pulled off from the wire crimp.

4.3.3 Insertion Force Test Method:

Fasten a pair of unmated counterpart contacts on tensile testing machine in suitable positions for mating when the machine is set operated, and the force required to insert plug contact into receptacle contact is measured by operating the head to travel with the speed at a rate of 25.4mm a minute.


4.3.4 Extraction Force Test Method:

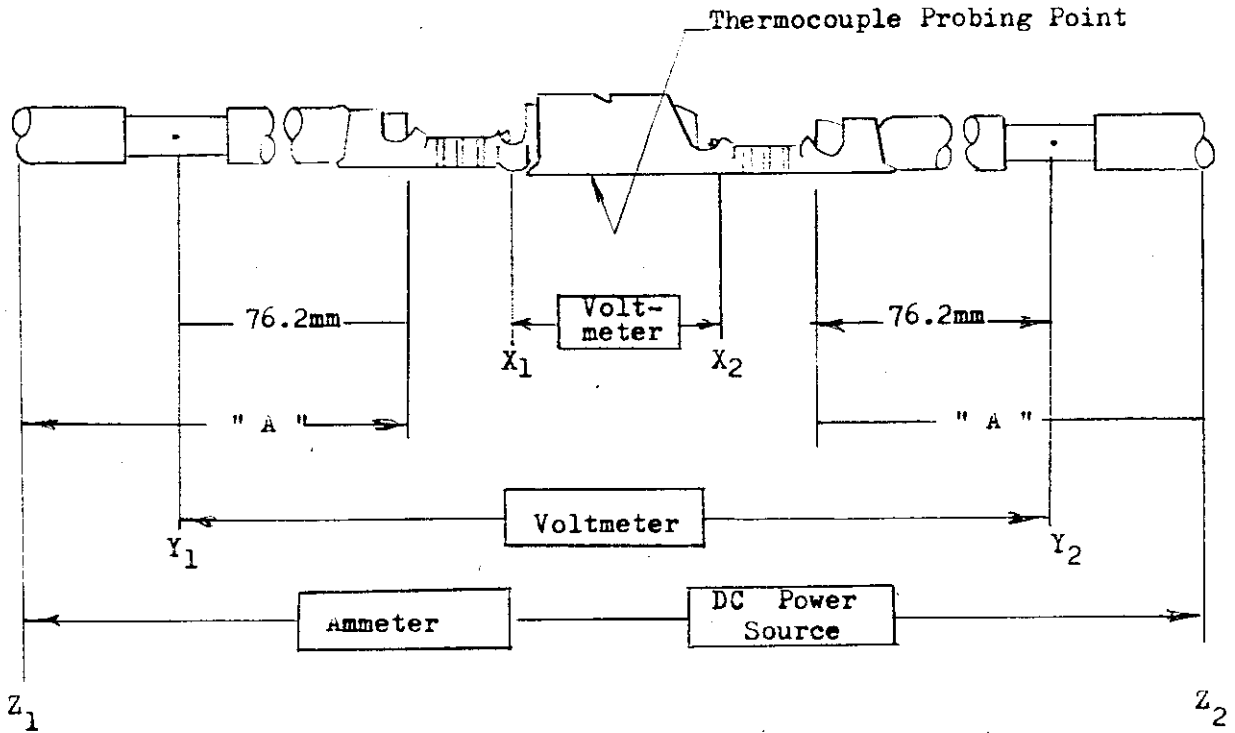
Fasten a pair of mated contacts on tensile testing machine, and apply a pull-off load to extract plug from receptacle by operating the head to travel with the speed at a rate of 25.4mm a minute. The force required to extract plug from receptacle contact shall be measured and recorded.

5. Test Equipment:

The following test equipment is used for evaluation testing on this product.

- (1) Shopper Tension Tester, manufactured by Ueshima Seisakusho
- (2) 300 kg Tension Tester, manufactured by Tokyo Koki
- (3) DC Ammeter, manufactured by Yokogawa Electric Works
- (4) DC Voltmeter, manufactured by Yokogawa Electric Works
- (5) Temperature Measuring Instrument, manufactured by Yokogawa Electric Works
- (6) Draft Free Chamber, manufactured by AMP-Japan
- (7) DC Source, prepared by AMP-Japan

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- A: Crimped lead wires must be long enough (approximately longer than 91.5cm) for sufficient effect of heat dissipation.
- B: Areas Y_1 . Y_2 must be stripped and uniformly soldered for stable measurement reading under probes.

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